

REVIEWS AND ABSTRACTS.

T. M. SALTER. The Genus *Oxalis* in South Africa. *Journ. S.Af. Bot.*,
Suppl. Vol. No. 1. Cape Town, Cape Times Ltd. 1944. 35/-

Southern Africa with its unique and interesting flora has for over two hundred years attracted the attention of botanists in Europe and this is reflected in the numerous descriptions and figures of Cape plants scattered about in publications of the eighteenth and nineteenth centuries. The standard scientific account of this flora, the *Flora Capensis*, was begun by Harvey and Sonder in 1859 and was subsequently completed under the aegis of the authorities at Kew, in 1933. Most of the work was carried out on dried material in European herbaria and in the earlier volumes, at any rate, on limited numbers of specimens. Furthermore, the majority of contributors had never been in South Africa. It is not surprising therefore that any botanist who attempts a serious study of a taxonomic problem in South Africa to-day, finds that systematic botany here is still in its infancy. To put it in other words, the authors of the *Flora Capensis* sketched in the outlines and it remains for us and those who come after us to fill in the details. Since the publication of the *Flora Capensis* vast numbers of specimens have been added to those of the older collectors, and the principal herbaria are stacked with material awaiting intensive study.

The publication of this monograph dealing with the large genus *Oxalis* is an important event, for here we find the old method of relying entirely on dried material in herbaria superseded by one in which emphasis is placed on the living plant. The author in the course of his investigation, which took over eleven years, travelled 40,000 miles and thus gained a real insight into the distribution of the genus and the inter-relationships of those elusive realities, the species. A significant fact is that as a result of this intensive work the total number of species has been reduced and not increased as might have been expected. When the research was started the number of known species was 311. Now we find the total is 208. Many of the 311 species had been described from poor or incomplete material and the present study has shown that a number of them belonged to species already in existence when they were first published. This reduces the number somewhat, but, as the author has himself added 65 new species, the reason for the total reduction in number has still to be sought. This lies mainly in the

creation of what the author terms group species and the resultant sinking of a large number of previously recognised species.

As long as a taxonomist, however gifted, confines his attention to dried herbarium specimens he is bound to join the ranks of the "splitters" and increase the number of species. Let him, however, go into the veld and study the plants in their natural habitats, and sooner or later he will find himself drawn towards the "lumpers". Specimens which at first had seemed to belong to well-defined species turn out to be members of a closely linked group, and the distinctions which appeared to be valid now become blurred as a bewildering array of intermediate forms is revealed. The majority of species within a large genus are simple and capable of definition but the presence of occasional group species is one of the most baffling problems of taxonomy and evolution. In better known floras of the northern hemisphere such group species are divided into subspecies, varieties, subvarieties, forms and so on and names or symbols are given to each. In South Africa, as the author rightly contends, far too little is known about these group species to make subdivisions of this kind either profitable or desirable. Such group species offer tempting lines of research for the geneticist and cytologist, and one of the most stimulating features of this monograph is that it opens up so many lines of research.

The difficulties encountered by the author in the course of the work were considerable. The flowers of *Oxalis* are extremely delicate and evanescent, so that in the preparation of dried specimens they had to be pressed with extreme care in the field. For further study, flowers were preserved in alcohol as many of the finer details of structure are lost in the dried specimen and cannot be revived. Then, too, as the author has shown, the bulb is an important diagnostic feature and as it is frequently deeply buried in hard ground, its extraction still attached to the aerial part of the plant is a laborious undertaking. Anyone familiar with the hard stony ground which is characteristic of the arid parts of South Africa will appreciate the patience that had to be exercised to obtain full and accurate data for this work. Much of the information contained in this monograph is new and it is difficult to single out special features for comment. Perhaps one of the most important discoveries is that both exendospermous and endospermous seeds are common within the genus and that this seed character is of phylogenetic significance. The recognition of the importance of the bulb is another valuable contribution. The author comments on the structure, life-cycle and multiplication of the bulbs in certain species and from his remarks it becomes apparent that here lies a wide field for future study.

The Journal of South African Botany is to be congratulated on the

excellence of this its first large-scale taxonomic revision. All features so essential to work of this kind are here : great care and patience in the collecting of data, critical study and, finally, clear and accurate recording of the results. The good keys to the species will be welcomed by all who take up the study of this fascinating and puzzling genus. Botany in South Africa owes Captain Salter a debt of gratitude for this wholly admira'le monograph.

M. R. LEVYNS.

CHARLES A. BROWN. A Source Book of Agricultural Chemistry. Pp. x + 290 + 1 plate. Waltham, Mass., U.S.A., The Chronica Botanica Co. (Chronica Botanica, Vol. 8, No. 1). Johannesburg, Juta & Co. 1944. \$5.00.

Although this is primarily a source book, the commentary is by no means inconsiderable and in some cases it tends to rival or exceed in amount the quotations from the published works dealt with and the formal treatment of their scope and contents. Excerpts are given from the works of each writer (with the exception of Hermbstädt) and the various editions and translations of their relevant writings are listed. For most writers there is appended a list of references, some of which contain references other than original sources. In addition to quotations, the scope of certain books is given, such as the relevant works of Einhof and Thaer, Davy, Schübler and Chaptal. There is a formal account of the contents of Gyllenborg's dissertation, prepared under the direction of Wallerius ; of Liebig's treatise on organic chemistry and its applications to agriculture and physiology ; and of de Saussure's " *Recherches chimiques sur la végétation* ", abstracts of each chapter of which are given. Following subject and author indexes, the book ends with an addendum on references to the history of agricultural chemistry from 1840 to 1940 as well as brief comments on various methods of treating the history of chemistry.

In the introduction, the scope of the term " agricultural chemistry " is considered. A strict definition is difficult and the phrase has been variously used. The writings dealt with approach, from a chemical angle, problems of soil in relation to crops ; chemical aspects of metabolism, especially plant nutrition ; and the utilisation of raw agricultural materials in the making of products prepared on the farm. Considerable attention is also given to fundamental aspects which on a stricter consideration belong to the history of chemistry proper, as is the case for example with Cavendish and Lavoisier. Fundamental work relating

to respiration and photosynthesis is dealt with. The agricultural writings examined show much variety and include not only original contributions, but writings illustrating the practices and ideas of a period or summarising previous knowledge. Except for Lavoisier's speculations on the energy relationships of human activities in relation to respiration and Liebig's writings, animal metabolism receives at best only passing mention. Subjects somewhat less closely related to agricultural chemistry receive some attention as is instanced by the account given of the experiments of Stephen Hales on the ascent of sap in plants.

The first group of writers dealt with (Chap. I) indicates the state of scientific speculation, technical methods and empirical practices of the ancient world. The necessity of giving some account of such speculations as the doctrine of the four elements and four qualities, the transmutation of these elements into one another and the atomic theory of Democritus becomes clear in subsequent chapters. Some of these views in one form or another continued to influence scientific thought until the nineteenth century. Thus it was not until 1842 that Wiegmann and Polstorff finally disposed of any lingering tendencies to regard the plant as obtaining its mineral constituents ("earth") by the transmutation of water. A detailed account of the crucial experiments of Wiegmann and Polstorff is given (pp. 223-224).

In the sixteenth and earlier seventeenth centuries (Chap. II) in addition to Greek conceptions, ideas, attitudes of mind and superstitious lore derived from medieval culture were prominent in such writers as Paracelsus and Glauber. But alongside these we find writers such as Francis Bacon, Palissy and Angelo Sala who are remarkably free from obsolete medieval crudities. These medieval elements recede increasingly to the background and at first other Greek speculations become more prominent, especially the atomic theory of Democritus (Chap. III). A growing appreciation of quantitative considerations is evident. The researches of Cavendish on the relative densities of gases and his synthesis of water, laid the foundation for the final rejection of the doctrine of an elementary air and of the elementary nature of water (Chap. V) but Cavendish did not himself take this step. The importance of quantitative considerations obtained conscious expression in the investigations of Lavoisier. He established the balance as the central instrument of chemical investigation and emphasised that "... an equal quantity of matter exists both before and after the experiment; ... and nothing takes place beyond changes and modifications in the combinations of these elements" (p. 170). Meanwhile we see the beginnings of the phlogiston doctrine (Chap. IV) and Dr. Brown shows how the domination of such a doctrine prevented in many cases a true

understanding of the facts elicited and yet allowed a brilliant galaxy of men to achieve much in spite of faulty theory (Chap. V). In this connection as in others (Mayow and Ingen-Housz) Brown emphasises the ease of attributing to older writers a clearer understanding of a sequence of facts than they actually possessed unless we bear in mind the conceptions which formed their intellectual background. The last chapter ends with Liebig who consolidated the more specialised field of agricultural chemistry although it was left to Boussingault to transfer investigation "... from the laboratory to the field and stable ..." (p. 239) thus emphasising the more purely experimental as opposed to the analytical approach of Liebig.

Interesting light is thrown on a number of matters which are often glossed over or omitted from historical treatments. Thus, while Grew's standing as a plant anatomist is generally known, his considerable work on the ash constituents and colours of plants is not so widely recognised since the botanical title of his book has caused chemists to overlook it. Incidentally, it is interesting to find Grew such a confirmed "mechanist" as to attempt to account for plant structures in terms of chainlike combinations of the crystals of different salts while more exclusively chemical investigators such as Glauber and Stahl introduced vitalistic explanations in dealing with such physiological functions as digestion. The neglect of Carl S. Sprengel, who has been confused with Kurt Sprengel the botanist, is dealt with. Although Carl Sprengel soon became discredited because of his peculiar vitalism of "life atoms" yet he anticipated Liebig in apprehending the conception involved in the law of minimum, in his rejection of the humus theory of nutrition and in his doctrine of mineral fertilizers. Brown points out that claims have been made for Liebig which cannot be sustained on more careful enquiry and this has been indicated to some extent above. To quote from the Preface of the book under review: "It has been too often overlooked that in his 'Organic Chemistry in its Applications to Agriculture and Physiology' Liebig was more a promulgator and defender of truths that had already been announced than a discoverer of new knowledge".

In one respect this book would seem to be incomplete. The opening chapter substantially ends with the first century of the Christian era and the second chapter opens with the early sixteenth century. In classical antiquity the appeal to experiment was limited and was used to confirm a theory rather than as a means of attaining new knowledge and in spite of certain activities, experimentation concerned with practical issues was not regarded as befitting a philosopher. The writers dealt with in the second chapter are drawn from all walks of life and include not only Francis Bacon and van Helmont but also the crafts-

man Palissy. These men, in spite of marked differences, clearly accepted experimentation as a means to knowledge and recognised the value of establishing useful knowledge which was also a prominent objective of the newly formed Royal Society. Although the book under review is primarily a source book of agricultural chemistry, its value would have been enhanced by the inclusion of an interlude or a short additional chapter dealing with these contrasts of outlook.

To give an adequate idea of the wealth of material in a source book of this kind is impossible in a short review unless it be reduced to a mere tabulation. Apart from the development of ideas and knowledge in relation to specific subjects, the material presented is of considerable general interest in relation to the emergence of our present scientific outlook and method of approach. In conclusion, the reviewer feels that we are indebted to Dr. Brown for making available to us so much interesting and valuable material, some of which has a quaint charm and fascination.

WM. EDWYN ISAAC.

THOMAS YORT HUM AND ROBERTSON PRATT: The Hottentot Fig as a possible commercial source of tannin. *Plant Physiology*, Vol. 19, No. 2, pp. 384-6. 1944.

Of interest to South African botanists should be the results of a recent investigation on the tannin content of the Hottentot Fig, *Mesembryanthemum edule* L. The plant, which is indigenous to South Africa, is widely distributed in sandy and rocky regions of the Central and Northern California coasts. Two workers, T. Y. Hum and R. Pratt, of the College of Pharmacy of the University of California, San Francisco, consider that *M. edule* is potentially a good source of tannins of the catechol or phlobotannin type.

The leaves were found to contain 19.4 per cent., stems 14.2 per cent. and combined leaves and stems 17.1 per cent. of tannin on the dry basis. Average stands of the plant in California, it is estimated, should yield 1,500 pounds of tannin per acre.

This tannin could be used in the manufacture of leather, yielding leathers without bloom; and it is probable that in conjunction with other tannins or materials, different classes of leather could be produced.

The sap and aqueous extract of the leaves were found to possess slight bacteriostatic activity when tested by ordinary bacteriological methods with *Staphylococcus aureus* used as a test organism. The authors think that the mild antiseptic properties and the great astringency

of the sap present a useful therapeutic combination, and suggest that the sap or the crushed leaves of *M. edule* could be used as an emergency application in the treatment of burns and minor cuts.

H. WEINMANN.

P. J. GREENWAY. Origins of Some East African Food Plants. Reprinted from the East African Agricultural Journal. 1944.

This pamphlet gives in a small space a remarkable amount of information about the origins of many well-known food plants. The author, who is Systematic Botanist at the East African Agricultural Research Institute at Amani, has been at great pains to gather together and to present in a very readable manner the history of a considerable number of plants used as food in East Africa, a subject on which most people, to whom the plants are otherwise well known, are usually very badly informed.

It is interesting to note how many of these plants come from the East, their original home being Asiatic or Pacific. Even those of American origin seem to have been introduced, in many cases, via the East. No doubt the Spaniards were responsible for bringing many American plants of economic importance, as well as weeds now firmly established in the Far East, across the Pacific to the Philippines in the days of the Agapulco galleons. In contrast the plants of African origin are relatively few.

M. R. HENDERSON.

ERRATA.

Notes on Burchell's Catalogus Geographicus in vol. X.

p. 145, line 6, for interpretation read interpretations.

p. 157, line 1, for MSS. read MS.

p. 160, line 14, for 430 read 289.

p. 160, line 16, for 890 read 799.